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(54) Title of the Invention: Teletext Broadcast Receiving System for Mobile Body

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Continued on final page

Specification

Title of the Invention: Teletext Broadcast Receiving System for Mobile Body

Claim

A teletext broadcast receiving system for a mobile body comprising a tuner for receiving television broadcasts installed in a mobile body, a teletext broadcast decoder that extracts and demodulates teletext data from a television broadcast signal received by said tuner, a memory that stores a plurality of screen portions of the teletext data obtained by said teletext broadcast decoder and a display means that displays the teletext broadcast data stored in said memory

such that, when at least one screen portion of teletext broadcast data for a teletext broadcast channel that has been deemed necessary has been demodulated by said teletext broadcast decoder, this screen of teletext broadcast data obtained by demodulation is stored in the corresponding area of said memory and the stored data of said memory is updated.

Detailed Description of the Invention

[Field of Application in Industry]

The present invention relates to a teletext broadcast receiving system for a mobile body preferably used in installations in mobile bodies such as electric trains.

[Summary of the Invention]

The present invention is a teletext broadcast receiving system for a mobile body that is installed in a mobile body such as an electric train wherein, when at least one screen portion of teletext broadcast data for a teletext broadcast program that has been deemed necessary is demodulated by a teletext broadcast decoder, this screen of teletext broadcast data that has been obtained by demodulation is stored in a corresponding area of a memory, the stored data of the memory storing teletext broadcast data is updated, and even when all of the data for the teletext broadcast program has not been received, the teletext broadcast program may be displayed favorably.

[Prior Art]

In recent years, television receivers have been installed in mobile bodies such as electric trains, images reproduced by VTRs and the like received and services provided to passengers. In such cases, an antenna is attached to the roof of the electric train, television broadcast signals received from ground-based transmitting stations by this antenna and images received.

[Problems to be Solved by the Invention]

However, the ability to receive these television broadcast signals has been limited to times when locations with comparatively good radio wave states are traveled through. In other words, with mobile bodies traveling through areas with many obstacles such as the buildings in cities, there are few locations where good reception is possible without unnecessary interference for the broadcast signals from the transmitting stations. The state of reception is very poor when a normal television antenna is just installed on a mobile body, and the images are often such that they are not good enough for practical use. For example, in the case of the Yamanote electric train line that runs roughly through the center of Tokyo, the distance from the transmitting stations is very short, and under normal circumstances it is area with a strong electric field capable of good reception even with a simply structured antenna. However, there are very many obstacles such as buildings, and it is close to impossible to receive television signals with conventional technology without ghosting.

In addition, radio waves for teletext broadcasts are transmitted using some television broadcast signals, but since these signals for teletext broadcasts are converted into digital data for transmission, it is impossible to receive the teletext broadcasts in moving bodies which are particularly sensitive to occurrences of ghosting.

It is an object of the present invention to make good reception of teletext broadcasts possible in moving bodies such as electric trains.

[Means to Solve the Problems]

As is shown, for example, in Fig. 1, the present invention comprises a tuner for receiving television broadcasts (43) installed in a mobile body (1), a teletext broadcast decoder (46) the demodulates teletext broadcast data extracted from a television broadcast signal received by this tuner (43), a memory (47) that stores a plurality of screen portions of the teletext broadcast data obtained by this teletext broadcast decoder (46) and display means (101), (102), (103) ... (124) that display that teletext broadcast data stored in this memory (47). When at least one screen portion of teletext broadcast data for a teletext broadcast program that is deemed to be necessary has been decoded by the teletext broadcast decoder (46), this teletext broadcast data that has been obtained by decoding is stored in a corresponding area of the memory (47), and the stored data in the memory (47) is updated.

[Work or Operation of the Invention]

Therefore, if the data for all screens for the teletext broadcast program initially deemed necessary is stored in the memory, the data for the teletext broadcast program may be updated sequentially even if only part of the data for a screen of the teletext broadcast program can be received while the mobile body is traveling or the like by updating only the data for this part that could be received to the latest data. All of the screen data for the teletext broadcast program deemed necessary is stored in the memory; therefore, display of all screens of the corresponding teletext broadcast program is possible at any given time.

[Embodiment]

In the following, an embodiment of the present invention will be described with reference to Fig. 1 through Fig. 4.

In this example, a television receiver is used in a receiving system that displays teletext broadcasts; therefore, the overall constitution of this receiving system will be described first.

In Fig. 1 and Fig. 2, (1) indicates a car body for an electric train, and doors (entrances and exits) (11), (12), (13) ... (16) and (17), (18), (19) ... (22) are provided in six locations on each side in the side surface of this car body (1). Television receivers (101), (102), (103) ... (124) are installed above the left and right door pocket parts for each of the doors (11) through (22) inside the car. As is shown in Fig. 2, for example, television receivers (117) and (118) are attached to the upper part of the door pocket part on the left and right of the door (19). In this instance, each of the television receivers (101), (102), (103) ... (124) is made low profile using liquid crystal panels or the like.

Furthermore, these various television receivers (101), (102), (103) ... (124) are for displaying teletext broadcasts, but to receive these teletext broadcasts, four antennas (30a), (30b), (30c), (30d) are attached to the periphery of ventilators (3) and (4) on the rooftop (2) of the car body (1). In this instance, each of the antennas (30a), (30b), (30c), (30d) has a dipole antenna

constitution comprising two conductive rods (31), (32) one of the ends of each being in proximity to each other and a reflector (33) disposed at a prescribed gap from these conductive rods (31), (32). The gap part between the two conductive rods (31), (32) is connected to a coaxial cable (35) (see Fig. 3) through a balloon (matching transformer), and this coaxial cable (35) is connected to a switching unit (41) inside an under-floor unit (40). The length of the two conductive rods (31), (32) is selected according to the frequency of the channel received, and the reflector (33) is longer than the length of the two conductive rods (31), (32) together.

Furthermore, the angles of attachment of the four antennas (30a), (30b), (30c), (30d) are offset 90° each in the horizontal direction. Antennas (30a), (30b) are attached to the front and back (direction parallel to the rails) of the ventilator (3), and antennas (30c), (30d) are attached to the left and right (direction perpendicular to the rails) of the ventilator (4) which is adjacent to the ventilator (3).

Describing the state of attachment of the antennas to the ventilators in detail here, this car body (1) has a plurality of ventilators (3), (4), (5) ... on the roof (2). These ventilators (3), (4), (5) ... are so-called forced ventilators that function as ventilation devices forcing air into the car from the outside while it is traveling, and legs (3a), (4a), (5a) at the four corners of each of the ventilators (3), (4), (5) ... are secured to the rooftop (2) by bolts (23). In this instance, each of the ventilators (3), (4), (5) ... is attached to the car body (1) in an insulated state.

Furthermore, two antennas (30a), (30b) are attached using the bolts (23) that secure the legs (3a) at the four corners of the ventilator (3). In addition, two antennas (30c), (30d) are attached using the bolts (23) that secure the legs (4a) at the four corners of the ventilator (4) which is adjacent to the ventilator (3).

Showing an enlargement of the state of attachment of these antennas (30c), (30d) to the ventilator (4) in Fig. 3 and Fig. 4, a U-shaped cover (24) is attached around the ventilator (4) by the bolts (23). In this instance, the cover (24) is such that it does not block the air passage part (4b) of the ventilator (4).

Furthermore, one end of linking members (34) forming the antennas (30c) and (30d) is secured to the top part of this cover (24), and along with each of these linking members (34) securing a reflector (33) substantially in the middle part, the conductive rods (31), (32) are secured to the other end. Here, the two conductive rods (31) and (32) are provided with a prescribed gap and secured to the linking member (34). In addition, insulating material is used for the linking members (34). In addition, in this example, an angle material with an L-shaped cross-section is used for the conductive rods (31), (32) and reflectors (33) and is such that they may easily attached.

Here, a space H in the direction of height between the upper part of each ventilator and the lower edge of the reflector (33) is set to at least 15 mm, and width L in the horizontal direction between each ventilator and the reflector (33) is set to at least a width of 20 mm. Furthermore, the reflector height B is set to 70 mm or greater. In this instance, larger values for the height H and width L of the ventilator and the height B of the reflector (33) itself are preferable in terms of the antenna characteristics, but the size of equipment that can actually be installed on the rooftop (2) is determined by standards such as rolling stock gauge. Very large antennas cannot be attached, and values somewhat larger than the values above are the limit for these values.

With the attachment of the four antennas (30a), (30b), (30c), (30d), each of the antennas (30a), (30b), (30c), (30d) only receives the radio waves oriented toward the conductive rods (31), (32). The radio waves oriented toward the conductive rods (31), (32) from the opposite side (ventilator side) are shielded by the reflector (33), and the generation of standing waves by reflected radio waves can be controlled. Therefore, radio waves that come from all directions in substantially 360° may be received by the four antennas (30a), (30b), (30c), (30d) that are installed in positions that differ by 90° each.

Furthermore, the four antennas (30a), (30b), (30c), (30d) constituted in this manner are connected to the switching unit (41) inside the under-floor unit (40) that is hung beneath the floor of the car body (1) by the coaxial cables (35). The equipment for receiving teletext broadcasts is housed in this under-floor unit (40), and the switching unit (41) selectively outputs receive signals supplied by any of the antennas under the control of a discriminator circuit (44) which will be discussed hereinafter. Furthermore, this switching unit

(41) supplies the received signal that is output to a ghost reduction tuner (43) via a booster (42), and this ghost reduction tuner (43) receives a television broadcast signal for a prescribed channel that is set in advance. In this instance, the ghost reduction tuner (43) uses a GCR signal that has been inserted into the vertical blanking interval, and ghost reduction is carried out on the received broadcast signal; therefore, a ghost suppression filter, GCR signal extraction circuit, comparator circuit, control circuit and the like are provided in both the channel tuning section and intermediate frequency amplifier/demodulator section. A GCR signal in which distortion due to diffuse reflection of radio waves and the like and a reference signal are compared, and reflected wave signals are suppressed.

Here, in this example, the prescribed channel television broadcast signal obtained by this ghost reduction tuner (43) is supplied to the discriminator circuit (44), and the level of the synchronizing signal included in the television broadcast signal received by this discriminator circuit (44) is determined. The selection of the antenna line by the switching unit (41) is set to the synchronous signal with the best level, and a so-called diversity antenna is formed.

In this instance, a timer circuit (45) is connected to this discriminator circuit (44), and the level determination described above is carried out in a prescribed interval with control by the timer circuit (45).

Furthermore, the television broadcast signal obtained by the ghost reduction tuner (43) is supplied to the teletext broadcast decoder (46), and a teletext broadcast signal of text, graphics and the like multiplied by the vertical blanking time for the broadcast signal is obtained by this teletext broadcast decoder (46). In this instance, a plurality of teletext broadcast programs are sent by a single channel television broadcast signal, and when at least one screen portion of data for a prescribed teletext broadcast channel set in advance has been obtained, this data is recorded in the memory (47) connected to the teletext broadcast decoder (46). In other words, the teletext broadcast decoder (46) has a circuit that determines whether or not each teletext broadcast screen that is received and obtained is complete. When it is determined that data for a complete screen for even one screen has been obtained by this circuit, and when this data is a teletext broadcast channel that is deemed necessary, it is stored in the memory (47).

Describing the constitution of this memory (47) here, the data storage part of this memory (47) is divided into a plurality of areas, and the areas are used as shown in Fig. 5. In other words, it is such that four teletext broadcast channels A, B, C, D may be stored, and there are areas a1 through a10, b1 through b10, c1 through c10 and d1 through d10 that can store 10 screen portions from page 1 to page 10 for each program. In this instance, areas a1 through a10, b1 through b10, c1 through c10 and d1 through d10 are such that the stored data for each area may be updated independently if they have data for a prescribed teletext broadcast program stored in them for the time being when operation of the car body (1) is started. When only the data for part of a page (screen) of one teletext broadcast program can be received, only the storage area for this page that could be received is rewritten. Therefore, there are instances where the stored data for each page making up the various teletext broadcast programs A, B, C, D is not stored at the same time. Moreover, when each of the teletext broadcast programs A, B, C, D is made up of 10 or less pages, the area for the page for which data could not be obtained is left empty.

Furthermore, the data for the prescribed teletext broadcast program stored in the memory (47) in this manner is sequentially read out to the teletext broadcast decoder (46) and formed into a video signal that displays the text, graphics and the like as images. This video signal is output from the under-floor unit (40) via a coaxial cable. When, in this instance, at least one screen portion of any program of the four stored teletext broadcast programs A, B, C, D is rewritten, this rewritten program is read sequentially from the first page to the final page and is displayed.

Moreover, the output video signal from the under-floor unit (40) is a baseband video signal (in other words a video signal that is not RF modulated). In this example, in addition, a power supply circuit (48) is provided in the under-floor unit (40), and a low voltage direct current power supply is output from this power supply circuit (48).

Furthermore, the coaxial cable that outputs the video signal from the under-floor unit (40) is connected to a three-way distribution unit (61) in the car body (1) to provide the output video signal. In addition, the power supply output from the power supply circuit (48)

is also supplied to the three-way distribution unit (61). This three-way distribution unit (61) is such that the baseband video signal is divided in three.

Furthermore, of the first, second and third distribution outputs from this three-way distribution unit (61), the first distribution output is supplied to a first two-way distribution unit (71), the second distribution output supplied to a connection terminal (62) provided on a connection surface on a first end (one end) side of the car body (1) and the third distribution output supplied to a connection terminal (63) provided on a connection surface on a second end (other end) side of the car body (1). In addition, the power supply supplied to the three-way distribution unit (61) is also supplied to the first two-way distribution unit (71).

This first two-way distribution unit (71) is such that it divides the baseband video signal that is supplied in two.

Furthermore, the first distribution output distributed by the first two-way distribution unit (71) is supplied to a second two-way distribution unit (72) connected to a subsequent stage, and the second distribution output is supplied to a 13th two-way distribution unit (83) that is connected to a subsequent stage. In this instance, the power supply supplied from the three-way distribution unit (61) side is supplied to the second and 13th two-way distribution units (72) and (83).

This second two-way distribution unit (72) divides in two in the same manner as the first two-way distribution unit (71), and the first distribution output is supplied to a television receiver (102) attached inside the car. The second distribution output is connected to a third two-way distribution unit (73).

Hereafter, the baseband video signal supplied by two-way distribution units (73), (74), (75) ... (82) connected to subsequent stages is divided in two in the same manner, and the first distribution output is supplied to the corresponding television receivers (103), (104), (105) ... (111) attached inside the car. The second distribution output is supplied to the two-way distribution units (74), (75), (76) ... (82) connected to the subsequent stage. However, the second distribution output of the 12th two-way distribution unit (82) connected at the end is supplied to a television receiver (112).

In this instance, the power supply supplied from the two-way distribution unit in the previous stage is supplied to television receivers connected to the various two-way distribution units and the two-way distribution unit in the subsequent stage.

In addition, the first distribution output of the 13th two-way distribution unit (83) connected to the second distribution output side of the first two-way distribution unit (71) is supplied to a television receiver (113) attached inside the car, and the second distribution output is supplied to a 14th two-way distribution unit (84) in the subsequent stage.

Hereafter, the baseband video signal supplied by two-way distribution units (84), (85), (86) ... (93) connected to subsequent stages is divided in two in the same manner, and the first distribution output is supplied to the corresponding television receivers (114), (115), (116) ... (124) attached inside the car. The second distribution output is supplied to two-way distribution units (85), (86), (87) ... (93) connected to the subsequent stage. However, the second distribution output of the 23rd two-way distribution unit (93) connected at the end is supplied to a television receiver (124).

In this instance, the power supply supplied from the two-way distribution unit in the previous stage is supplied to television receivers connected to the various two-way distribution units and the two-way distribution unit in the subsequent stage.

Moreover, when the connection terminals (62) and (63) provided on the connection surface are linked before and after to another car that is not provided with a tuner and the like, it is connected to a video signal input terminal in this linked car (not shown in the drawings). The video signals for the teletext broadcasts and the like may be supplied to preceding and following cars. In this instance, the power supply necessary for the television receivers in the preceding and following cars is supplied by a power supply circuit in each of the cars.

Next, the operation when teletext broadcast images are displayed on the television receivers (101), (102), (103) ... (124) connected in this manner will be described.

First, the teletext broadcast is received, and the data for the teletext broadcast program deemed necessary is stored in the memory (47) connected to the teletext broadcast decoder (46). If, in this instance, the state of reception for the television broadcast signal is good, the operation of storing to the memory (47) is completed in a short time, but service is actually provided when the car (1) is traveling. Therefore, when the reception state is temporarily good and when at least one screen portion of data for a teletext broadcast programs deemed necessary can be obtained by the teletext broadcast decoder (46), this data for the screen that is obtained is stored in the memory (47), and the data for the same page that was stored previously is updated newly to that received.

In other words, as is shown in the flow chart in Fig. 6, the screen for the teletext broadcast program

received by the teletext broadcast decoder (46) is assembled, and a determination is made as to whether the screen that is assembled is a complete screen (in other words, whether the screen that is assembled has parts missing). Furthermore, when the screen that is assembled is complete, the data for this screen is written to the corresponding area of the memory (47), and the data in this area is rewritten. Furthermore, when this rewriting occurs, the stored data in the memory (47) for the teletext broadcast program that is rewritten is read so that is displayed sequentially starting with the first page, and they output video signal is created by the teletext broadcast decoder (46). In addition, when the assembled screen is determined to be an incomplete screen, the assembled screen data is discarded, and at this time the received data is not stored.

When a teletext broadcast program is received, the direction of the transmitting station as seen from the car (1) varies because of the travel, but the constitution is a diversity antenna that determines whether it is possible to have good reception from any of the four antennas (30a), (30b), (30c), (30d) in directions differing by 90°. Connection to the tuner (43) side is made with each of these antennas (30a), (30b), (30c), (30d) in order by the switching unit (41), and the state of reception is sequentially determined by a determination circuit (44) in the ghost reduction tuner (43). The connection is made to the antenna obtaining the best broadcast signal.

Moreover, since having a temporarily good state of reception and obtaining a screen for a teletext broadcast program deemed to be necessary by the teletext broadcast decoder (46) is limited to extremely good states of reception, most are when the train is stopped at stations and the like. In other words, for example, in the case of an electric train traveling as a local train in the city center, the train is stopped several tens of seconds to one minute at a station every 2 to 3 minutes of travel. The possibility of reception of a teletext broadcast program during this train stoppage being possible is high, and reception of teletext broadcasts is possible with the comparatively high frequency. In this instance, the time necessary for a one screen portion of the one teletext broadcast program to be transmitted is often normally under one second and at the longest several seconds; therefore, it is sufficiently possible to receive a teletext broadcast program using the constitution described above.

Furthermore, if teletext data can be imported into the memory (47) connected to the teletext broadcast decoder (46) in this manner, the data for the teletext broadcast program displayed at prescribed intervals is read and the video signal that displays the teletext broadcast is created. This video signal is transmitted to the television receivers (101) through (124) via the various distribution units (61), (71) through (93), and the teletext broadcast program is displayed on the television receivers (101) through (124) disposed in this car. In this instance, the four teletext broadcast programs stored in the memory (47) are displayed sequentially in a cycle of several minutes to several tens of minutes. However, when new teletext broadcast program data can be received as described above, this program that can be received is displayed starting with the first page.

Moreover, in the embodiment described above, only teletext broadcast receiving equipment was installed, but VTR and other image reproduction equipment may be provided, and reproduced images may be displayed instead of the teletext broadcast program. In addition, this was such that when data for a teletext broadcast program can be received, this teletext broadcast program was displayed, but the four teletext broadcast programs may be displayed sequentially in each prescribed time period regardless of the state of the reception of data.

In addition, in the embodiment described above, the receiving system was installed in an electric train, but it may be used in another mobile body (automobile, ship or the like).

Furthermore, the present invention is also not limited to the embodiment described above and various other constitutions naturally possible.

[Effects of the Invention]

According to the present invention, even when only the data for some screens for this teletext broadcast program can be received during the traveling or the like of a mobile body, just the part of this data that could be received is updated to the most recent data, and the data for the teletext broadcast program is updated sequentially to the most recent data. Teletext broadcast programs using comparatively the most recent data may always be displayed even if the state of reception in the mobile body deteriorates because of travel or the like.

Brief Description of the Drawings

Fig. 1 is a block diagram showing an embodiment of the present invention. Fig. 2 is a partial cutaway perspective view showing the state of the system of an embodiment installed in a car body. Fig. 3 is a perspective view showing the important parts of an embodiment. Fig. 4 is a side view showing the important parts of an embodiment. Fig. 5 is an explanatory diagram showing the state of use of the memory of an embodiment. Fig. 6 is a flow chart to

accompany a description of an embodiment. (1) is a car body, (3), (4) ... (8) a ventilator, (30a), (30b), (30c), (30d) antennas, (40) under-floor unit, (41) switching unit, (43) ghost reduction tuner, (46) teletext broadcast decoder, (47) memory, (48) power supply circuit, (61) three-way distribution unit, (62), (63) connection terminals, (71), (72) ... (93) two-way distribution units and (101), (102) ... (124) television receivers.

	Program A	Program B	Program C	Program D
Page 1	a1	b1	c1	d1
Page 2	a2	b2	c2	d2
Page 3	a3	b3	c3	d3
Page 10	a10	b10	c10	d10

Example of memory areas
Fig. 5

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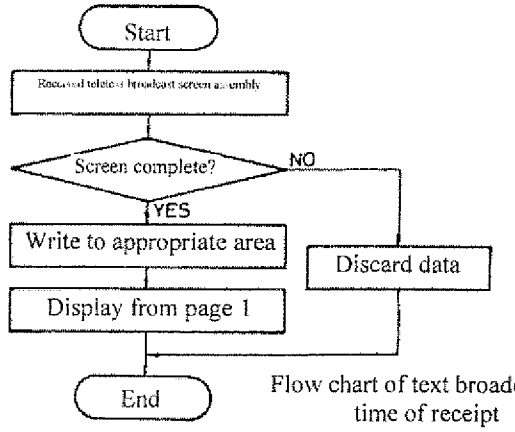
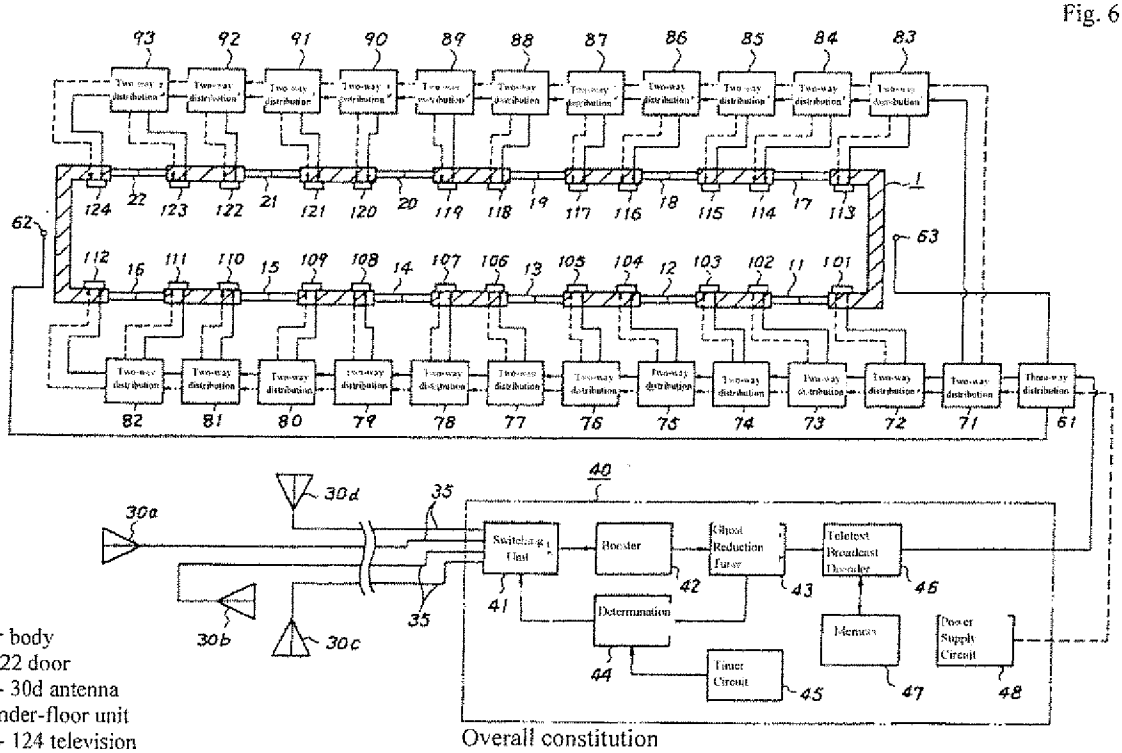
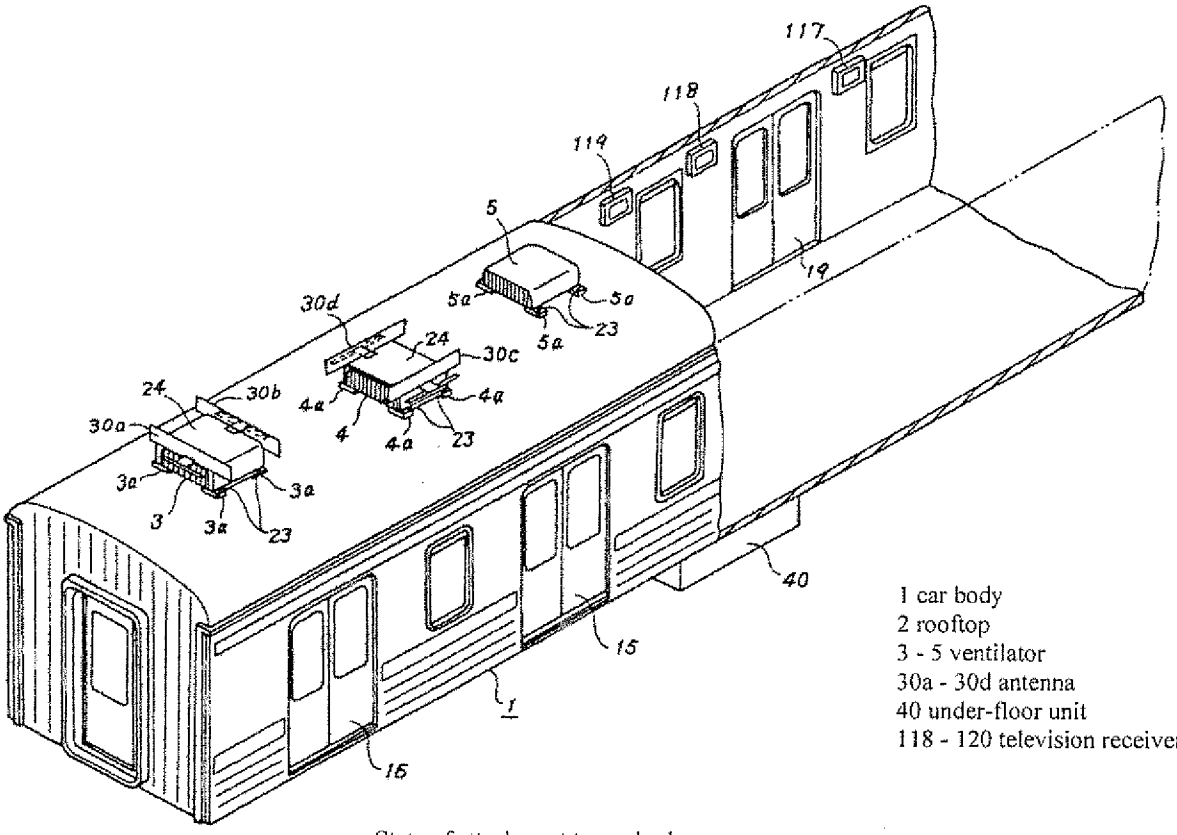


Flow chart of text broadcasting time of receipt
Fig. 6



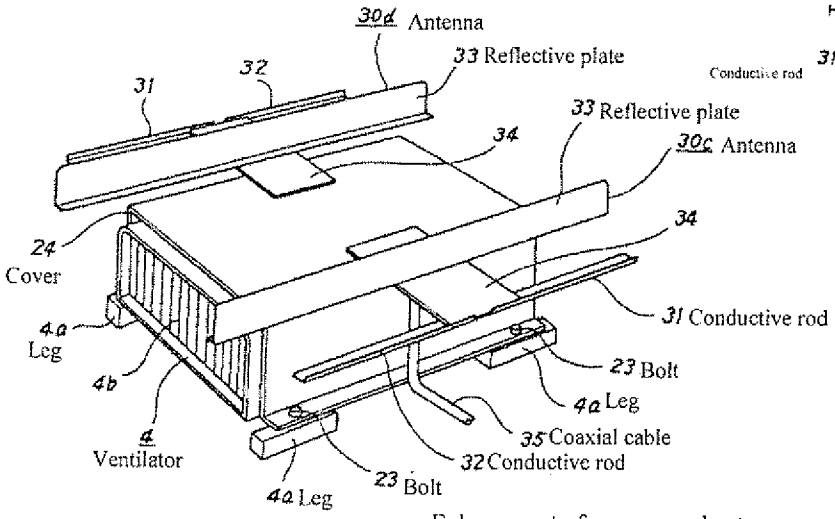
1 car body
11 - 22 door
30a - 30d antenna
40 under-floor unit
101 - 124 television receiver

Overall constitution
Fig. 1

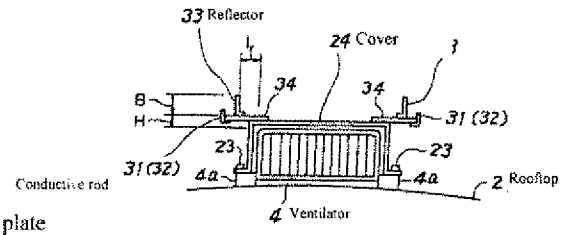


1 car body
2 rooftop
3 - 5 ventilator
30a - 30d antenna
40 under-floor unit
118 - 120 television receiver

State of attachment to car body
Fig. 2



Enlargement of area around antenna
Fig. 3



Drawing showing state of attachment of antenna
Fig. 4

Continued from first page
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